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ABSTRACT

A life sciences network which will be one of ten Australian resource sharing networks to be developed by the Australian National Scientific and Technical Library (ANSTEL) is proposed. The study outlines major elements and concepts of the system, including technical considerations, costing, management, and an implementation plan for the network. Background information on relevant earlier studies and reports is also provided. (Author/KP)

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National Library of Australia

DEVELOPMENT OF RESOURCE SHARING NETWORKS

In the framework of UNISIST (World Science Information System), NATIS (National Information System) and ALBIS (Australian Library Based Information System)

NETWORKS STUDY NO. 1

LIFE SCIENCES INFORMATION NETWORK

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

Canberra
National Library of Australia
1976

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National Library of Australia.
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PREFACE BY KENNETH MYER, CHAIRMAN, NATIONAL LIBRARY COUNCIL

This proposal for a life sciences network is the first to be issued by the National Library Council since the publication of Development of Resource Sharing Networks in the framework of UNISIST, NATIS and ALBIS. Interim Report and Surveys. This volume was published as a matter of urgency in order to indicate the future proposals of the National Library Council following the reduction in its estimates and the curtailment of the ALBIS Feasibility Studies.

The proposals of the National Library Council for the future were unanimously endorsed by its five advisory committees on which served representatives of the three Academies, of AACOBS, of the Council of State Librarians and the Library Association together with persons drawn from a wide range of Federal, State, industrial and voluntary organisations. In its proposals for the future the National Library Council indicated that it would continue to try to implement the objectives of UNISIST, NATIS and ALBIS by concentrating on priority networks being developed within the national subject libraries in the National Library.

At a meeting of some 275 potential participants in resource sharing networks, which was chaired by the deputy chairman of the National Library Council (Senator Gordon Davidson), the Minister for Administrative Services (Senator R.G.Withers) indicated that the Government endorsed the concept of resource sharing networks, but could not during the present economic situation, promise a financial commitment. However, he encouraged the continuation of planning.

Fortunately the National Library had already made notable progress in resource sharing in a number of areas. This was particularly well advanced in the field of the life sciences, owing to the enlightened and generous support of the Department of Health in sharing its resources with the National Library. An on-line network was in course of development before the ALBIS studies were commenced, and since their curtailment has been developed through the continued resource sharing of the Department of Health and the National Library.

The National Library Council has accepted the recommendations on the development of a life sciences network which were made by the Director-General, the Assistant Director-General Science and Technology, the distinguished consultant Dr Martin Cummings, Director of the US National Library of Medicine, Colin Freeman, Principal Librarian Life Sciences, and Mike Middleton, Chief MEDLARS Analyst. Resources, however, are not currently available to implement all of the recommendations but priority is to be given to the establishment of a national on-line service linking the National Library with all State capitals. Other reports will appear later on other networks under development such as those for Education, shared cataloguing, Industry, etc. There will also be special studies of such vitally important areas in a national information system as charging policies, surveys of new technology, standards and manpower problems.

The National Library Council hopes that in spite of all the disappointments arising from the failure to secure adequate resources for its major new responsibilities, considerable progress will be possible by making maximum use of resource sharing in Australia.

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INTRODUCTION

By Dr G. Chandler

Director-General, National Library of Australia.

The Interdepartmental Committee, formed to examine the potential of an Australian Library Based Information System (ALBIS), recommended in its report published in July 1974, that the National Library undertake the management of a program of consultations and studies by a project team.

The system should have four main components:-

(a) A comprehensive collection of library materials covering all fields of knowledge held by administratively separate organizations throughout the nation.

(b) Library services whereby library materials would be made available to the public through decentralized and administratively separate organizations.

(c) Collections of library material and/or indexes thereof held in machine form (data bases) and mechanized methods of access to facilitate the retrieval of information, and to generate current awareness bulletins. In the longer term, the data bases would be stored in mutually compatible installations with the capacity to provide direct and immediate access.

(d) Linkage of the previous three elements through telecommunications facilities enabling access by any one member to the pooled collections and services of all other members.

The National Library was specifically charged by the Inter-departmental Committee to prepare a total budget and a phased implementation program for the ALBIS system. Unfortunately staff and financial cuts imposed upon the Library produced a situation within which it was not possible to undertake all the detailed studies considered necessary for the planned development of ALBIS.

Operational experience in the subject divisions of the National Library over an extensive period of time had confirmed however, a need for subject networks. This was subsequently confirmed by a survey of Australian libraries. Reports from directors within the National Library indicated that total costs for the networks would be of the order of $25,000,000 p.a.

Due to the budgetary cuts enforced upon the National Library, mentioned above, the only detailed investigation of a network possible was that undertaken by ANSTEL for the Life Sciences with the assistance of the National Library Consultant, Dr M. M. Cummings, Director of the U.S. National Library of Medicine.

The brief for Dr Cummings was as follows:

> "The proposed Life Sciences network is one of approximately 30 proposed networks, of which the National Library will be the focal point by virtue of its responsibility for
>
> 1) the national reference, lending and information library for science and technology - ANSTEL
>
> 2) operation of MEDLARS and BIOSIS
>
> 3) national focal point for UNISIST
>
> 4) national focal point for ALBIS (Australian Library Based Information System)
>
> It will be one of the ten networks of ANSTEL (the Australian National Scientific and Technological Library), the first of the subject units of the National Library.
>
> The design of each network includes a survey of the existing provisions for traditional, computer-based, referral and know-how (consultancy services), the preparation of plans for the phased development of the services over 5 years including the introduction of nation-wide on-line facilities, the designation of sub focal points for traditional, computer-based, referral and consultancy services for specific areas within the Life Sciences, and the preparation of estimates of the capital and running costs for the services operated directly by the National Library or for public use of services offered by sub focal points."

Unfortunately further budgetary restrictions made it impossible to provide Dr Cummings with the support surveys to assist him in implementing the full brief. However, the Assistant Director General (Science and Technology), Mr Bryan Yates, the Principal Librarian, Life Sciences, Mr Colin Freeman and the Chief Medlars Analyst, Mr Mike Middleton have supplemented Dr Cummings' excellent account of the major elements of a life sciences information system.

The National Library Council is grateful to Dr M.M. Cummings for his assistance and has accepted in principle his proposals for the major elements of a life sciences information system. It has also approved in principle the supplementary proposals of Mr Bryan Yates, Assistant Director General (Science and Technology), Mr Colin Freeman, Principal Librarian, Life Sciences, and Mr Mike Middleton, Chief Medlars Analyst. It has now accepted in principle the proposal of the Director General that priority shall be given to a health sciences network, but it is already clear that the full implementation of the proposals will not be possible 1976-7 owing to budgetary and other restrictions. Nevertheless it is planned to offer initial on-line services to all State capitals 1976-7.

ANSTEL and a LIFE SCIENCES INFORMATION NETWORK

By Bryan Yates,
Assistant Director-General (Science & Technology)

The provision of information services in the Life Sciences is one part of the information resource being developed by ANSTEL, the Australian National Scientific and Technological Library. ANSTEL has a role to identify the information needs of the community, identify gaps and encourage the appropriate organizations to fill them and to make a maximum contribution through its own extensive resources.

It is developing ten resource sharing networks to meet the needs of the Australian community by integrating the information resources in specific areas which already exist in Australia, and planning to increase these resources, either within Australia or from worldwide resources, as the need demands. The priority network to be developed is that concerned with the Life Sciences and the following report outlines the plans for this development.

1.1. LIFE SCIENCES INFORMATION NETWORK

1.1.1. Introduction

Early in 1967 the National Library of Australia took the first steps toward the rationalization of information resources in certain aspects of the Life Sciences field when it commenced discussions with the then Commonwealth Department of Health and the National Health and Medical Research Council.

The original discussions concentrated upon the idea of establishing full co-operation in the development of Medical Library services in Australia, in the first instance, for Federal departments, but in the longer view for the country as a whole. At the same time the Australian Medical Association approached the National Library and pressed for the establishment of a National Library of Medicine to provide:-

(1) A comprehensive medical library service on a national basis for the medical profession.

(2) Co-operation with other national medical libraries, and in particular with the U.S. National Library of Medicine, to enable the MEDLARS service to become available to the profession in Australia.

Although resources were not then available for the establishment of a National Medical Library service, it was seen that the National Library and the Department of Health could join in the establishment of a MEDLARS service for Australia.

The National Library advised the Australian Advisory Council on Bibliographic Services (AACOBS) that these discussions had taken place, and later that year the Council met to discuss the general implications of National Medical Library services.

A submission was received from Mr Allan Horton, Librarian of the University of New South Wales, pointing out the undesirability of locating a MEDLARS service in Canberra. Other University Librarians had also expressed an interest in setting up the service outside of Canberra.

The U.S. National Library of Medicine decided after reviewing the Australian situation, that it would prefer to deal with the Department of Health as a representative national body. Subsequently, the Department of Health and the National Library agreed to offer the MEDLARS service to Australian users as a co-operative effort.

1.1.2. AACOBS

In mid 1968, AACOBS Standing Committee received a report from Dr B. D. Foote, Readers Services Librarian of the University of New South Wales and the Convenor of the AACOBS Committee on Medical Library Services.

The report recommended that a survey of medical and related libraries be carried out in Australia to identify:-

(a) Existing resources.

(b) Categories and use of medical information.

(c) All classes of personal users of medical information.

(d) Make recommendations on:-

(1) Methods of co-ordination of medical information and resources in Australia.

(2) A method for the development of a co-ordinated hierarchy of responsibility for services.

(3) The application of present and future technical possibilities to the manipulation of information.

(4) Effective methods of providing sufficient funds for a continuing program of co-ordination of medical information resources and services in Australia.

Dr Foote clearly stated that information required by workers in the medical field included information in the related biological sciences, so that some consideration of these sciences was inseparable from any survey of medical information needs and resources.

Unfortunately, AACOBS could not obtain enough funds from its co-operating members and the project did not continue. Efforts to conduct the survey soon conflicted with the development of the STISEC survey of library resources in Australia, and in 1974 the AACOBS Committee on Medical Library Services was disbanded

1.1.3. STISEC

In May 1970, the Council of the National Library of Australia invited representatives of Commonwealth departments and authorities to confer with the Library on the direction it should take in the development of its collections and services in the fields of science and technology, having regard to the departments' and authorities' policies and future planning, and the possibility of co-ordination of efforts and activities.

The resulting meeting was exploratory in nature, but the recommendations arising therefrom, coupled with the concern expressed by industry, universities, state libraries, library organizations, and various other involved institutions, led the National Library Council, with the approval of the Prime Minister, to establish the Scientific and Technological Information Services Enquiry Committee (STISEC) in early 1971.

As a result of the general recommendations within the STISEC report, it was seen that the most economic and efficient provision of information resources and services in science and technology would be achieved by a co-operative national organization of libraries, and of information services in a hierarchical network. Libraries and information services at each level would provide those resources and services deemed essential, or indicated by reasonable economy, and rely upon the next higher level of the hierarchy to support and supplement their activities. The efficiency of such a structure would depend upon systematic and co-ordinated use of the total Australian resources in order to avoid unnecessary duplication of collections or services, while at the same time ensuring that all real needs for information were promptly met.

1.1.4. National Library developments

The STISEC report had identified, amongst its other deliberations, a clear need for the development of automated information services in Australia, and in recognition of this fact the National Library decided to expand its services to the biomedical community by adding the BA PREVIEWS service to its now established MEDLARS operation. Newly appointed staff were joined together with existing MEDLARS staff, into the newly formed Life Sciences unit which was seen as the embryonic beginning of a sophisticated computer based information service for Australia.

MEDLARS is of course an international system and as part of normal desirable systems development, the U.S. National Library of Medicine had developed a more sophisticated system known as MEDLARS II. The National Library, in conjunction with the Australian Department of Health, moved from MEDLARS I to the more sophisticated MEDLARS II during 1975. Amongst the many new improvements available, the system offered a powerful capability to provide on-line services to terminals remote from a central computer.

It was clearly seen however, that this next stage of development, desirable though it may be, must be placed within the context of other developments in the library field in Australia, in particular:-

* Development of ANSTEL and its services.
* The known need for a rationalization of biomedical and related information services in Australia.

* The overall recommendations of the STISEC report.
* The reinforcement of the general principles of the STISEC report as evinced by the ALBIS submissions.

1.1.5. ALBIS

It was decided during initial consideration of the ALBIS feasibility studies that a comprehensive report should be prepared in connection with the Life Sciences Network, and the preliminary brief was prepared for a consultant.

The Director-General of the National Library, Dr George Chandler, accordingly sought the assistance of an eminent worker in the field of biomedical information services, to act as a consultant. It was considered that with advice from the consultant, the National Library could blend its ongoing plans for the development of computer based information services and the development of the Australian National Scientific and Technological Library, (ANSTEL) with the known requirements for a greater rationalization of information resources in the Life Sciences.

Dr M. M. Cummings, Director of the U.S. National Library of Medicine, arrived in Australia in August 1975, and over a period of five months, in company with the Principal Librarian, Life Sciences (NLA), visited a number of institutions in the State capitals of Australia. Unfortunately further financial constraints were imposed upon the National Library at this time and consequently Dr Cummings was not able to develop a fully documented survey of the Life Sciences information field in Australia as had originally been intended. His opinion was that a prototype network in the broadly defined field of the Health Sciences could be practically established in Australia in the first instance, with a later expansion into the wider Life Sciences field as resources became available.

Owing to budgetary restrictions the ALBIS feasibility studies have come to an end. Nevertheless the proposals of the National Library Council to develop priority resource sharing networks in the framework of UNISIST (World Science Information System), NATIS (National Information Systems) and ALBIS (Australian Library Based Information System) have been approved in principle, and every effort will be made to implement these within current financial constraints. The Health Sciences Information Network is high in priority and is scheduled to become Australia's first on-line information system linking all State capitals.

2. LIFE SCIENCES INFORMATION NETWORK

By Dr M. M. Cummings

2.1. MAJOR ELEMENTS OF A LIFE SCIENCES INFORMATION SYSTEM.*

Life Sciences may be defined broadly or narrowly. For the purpose of this report, the Life Sciences will be identified as those activities relating principally to biology, medicine, the allied health professions, and certain other disciplines associated with the Health Sciences. It is my considered judgment that the principal efforts should be directed first in fields such as biology and medicine with expansion into other related disciplines following the demonstration that a viable efficient information system can be created and successfully operated by NLA.

The following elements were identified for study and development in the construction of the Life Sciences Information Network:-

(a) Centralized management apparatus

(b) Unified bibliographic apparatus

1. National Union list of serials
2. National catalogue of books and monographs

(c) Computer based reference and information services

(d) Efficient inter-library loan apparatus

(e) National referral centre

(f) Regional centres: A series of decentralized operational units within associated institutions geographically strategically located for resource sharing and the provision of special library and information services.

(g) Education and training programs for:

1. Network participants, and
2. Network users

(h) Functional relationships in a network

1. Concepts
2. Advisory apparatus.

* The material in this report is taken from a study prepared for the National Library of Australia which includes additional observations judged by the National Library Council and its Directors not to be relevant to this report.

A. Centralized Management Apparatus

The operation of a network requires a single organization to be responsible for the management of the system. In addition it requires a policy and technical advisory apparatus. The centralized management apparatus required for overall policy direction should include high level representation from the major participating organizations and institutions.

It is suggested that the following persons be invited to serve on the Health Sciences Information Advisory Committee:-

* Asst. Director-General, ANSTEL, Chairman
* Asst. Director-General, Health, Vice Chairman
* Representative of Library Council, Policy Liaison
* Vice-Chancellor or University Librarian of the five participating Universities.
* Representatives of Australian Medical Association or its branches.
* Representative of Biomedical Sciences
* Principal Librarian, Life Sciences, Executive Secretary.

The Management Advisory Committee may be required to meet several times in the first year of implementation of the network, subsequently they should meet at least once a year to review the progress and performance of the system.

The present Technical Co-ordinating Committee, comprised of NLA and Department of Health technical staffs, should be retained with the Chairmanship being rotated annually between the Principal Librarian, Life Sciences NLA, and the Chief of ADP, Health. Outside consultants should be available to this Committee if required. This committee should meet monthly to review all technical aspects of the computer-based information services.

B. Unified Bibliographic Apparatus

1. National Union List of Serials

Although it produces a national union list of serials in the social sciences (SALSSAH), the NLA does not maintain a current national union list of other scientific serials, which is an essential requirement

for the efficient operation of an organized inter-library lending apparatus. This function is presently being performed by the CSIRO Library and Information Services but their publication is not current. A new edition of "Scientific Serials in Australian Libraries" is being produced from input provided by the NLA and other Australian Libraries. It is suggested that ANSTEL continue to provide the CSIRO with a comprehensive list of its journal holdings and make arrangements to develop a jointly sponsored national union list of scientific serials. The CSIRO should consider using the machine-readable serials record system being developed by the NLA for production of SSAL. This would ensure compatibility between SALSSAH and SSAL. Local and Regional libraries must have available a location file for identification of serial titles if library lending is to be transformed from its present incoherent search for documents to a system where librarians and the user may expect to find materials they require in a reasonable time-frame.

The National Union List of Serials (based on the CSIRO "Scientific Serials in Australian Libraries") should be published annually and should be maintained in a way which allows it to be converted to a machine-readable format for computerized search and retrieval at an early date.

2. National Union Catalogue of Books and Monographs

A National Union List of Serials, coupled with the plan to produce and maintain the National Union Catalogue in MARC record format, provides the basis for a total Australian computer-based bibliographic apparatus.

The National Library of Australia is now engaged in the processing of Australian bibliographic input to produce standard MARC (machine-readable cataloging) format records used in the bibliographic processing system. It also produces the Australian National Bibliography using computer techniques for composed output. It provides an Australian MARC record service which enables subscribers to select from a data base of approximately 800,000 U.S., British and Australian MARC entries.

C. Computer-based Reference and Information Services (N.L.A.)

Using external computer facilities either provided through an IBM Service Bureau or through the Department of Health,

current awareness services are given through the following data bases:-

1. MEDLARS
2. BA PREVIEWS
3. Science Citation Index (General)
4. ERIC
5. Social Sciences Citation Index.

Only the MEDLARS system provides the capability of retrospective search services which seem to be in great demand by the library community. With the exception of the MEDLARS services which provides 2,500 SDI services, all the other data bases are operated on a very limited basis: e.g. only 100 profile searches are made from SCI and SSCI. The second largest profile service is given through BA PREVIEWS where approximately 600 profiles are processed. In the aggregate the science and technology specialized information services represent more than 85% of all specialized computer-based services provided by the National Library.

At present there are no charges for batch mode computerized reference services. No systematic or formalized evaluation of the services provided are made on a regular basis although MEDLARS and BA PREVIEWS users are asked to provide feedback from time to time.

D. Efficient Inter-library Loan Apparatus

At present there is no formal national system of inter-library loans in Australia. Large libraries are usually lending libraries while small ones are borrowers. Often users make requests for loans from the U.K. because of the difficulties of obtaining materials readily in Australia. There is no reimbursement made to the libraries which are generous in providing ILL's and there is no reliable way to know the location of available materials. Thus, it is recommended that a National List of Serials be made available by NLA using CSIRO "Scientific Serials in Australian Libraries" as a location file for all holdings in the network.

The user should make his loan request first to the nearest local library. If this cannot be satisfied it should be transferred by Telex to the nearest sub-regional library centre for fulfilment. Those requests not satisfied at this level should then be promptly referred to the

Regional Centre where 80-90% of all requests should be fulfilled in 2-3 days. Those requests not satisfied at the Regional library may then be sent to another Regional Library or to the NLA for ultimate satisfaction. For materials not held within Australia, the request made should be referred to the British Lending Library or the National Library of Medicine as a court of last appeal.

Since institutions have no regular budget for inter-library loans they should be reimbursed for these services. It is recommended that the NLA provide $1 - $2 per loan, or photocopy of articles to those institutions which provide them to users outside of their normal user group. This can best be done through negotiable contract.

It is generally true that improved bibliographic services call forth an increased demand for the documents cited, this inevitably leads to the requirement of an improved inter-library loan apparatus. In most cases the user calls for copies of articles appearing in leading serial publications. The National Library of Medicine experience suggest that 90% of requests will relate to journal literature and 10% for books and monographs. As the budget for local and university libraries decrease, the demands for service shifts to regional and national resources. It may be expected therefore that significant increases in loan requests will be made of ANSTEL specifically, and the NLA generally. Unless funds are provided to local or regional resources to absorb some of this burden, plans should be made to increase the manpower resources of the loan and location division of the NLA within a 3 year period from the inception of network operations.

E. National Referral Centre

A National Referral Centre which is designed to receive and transfer non-conventional requests for medical information is needed to serve the health community which operates distant from urban centres. The Referral Centre should develop and maintain directories and inventories of sources of medical information not generally available in the published literature.

The user should be able to expect his query to be switched to the department, institution or even the individual most competent to provide the data or information requested. This activity will require a qualified health professional as manager.

The referral centre might operate on a decentralized basis in centres like Sydney and Melbourne where significant aggregations of health related institutions exist. In such an arrangement it will be necessary to obtain permission in advance to have user requests referred to the participating individuals or institutions. A similar arrangement might be made to involve professional societies and associations in this effort.

F. Regional Centres

It is my judgment that the regional centres should be university based because they have the most significant collections and resources related to the health sciences. The following criteria are suggested for selection of institutions to serve as regional centres within the network:-

1) Commitment from Vice-Chancellor and University Librarian to provide administrative support for the regional centre.

2) Demonstrated adequate library resources to fulfil inter-library loan and other functions required by the network.

3) Geographic location within a dense concentration of potential biomedical users.

4) Commitment to provide equal access to network resource to remote users.

The Council and Director-General, NLA, may wish to evaluate other facts which have a bearing on site selection.

Sub-regional centres can be selected as required at a later date using the same or similar criteria.

G. Education, Training and Consultation

There is no individual within ANSTEL or the NLA fully trained to manage and operate the system. It is urgent that the present Principal Librarian, Life Sciences, or someone who will be responsible for senior local management of the network, receive training in on-line systems management. This will require a 3-4 weeks stay at the NLM and other institutions which produce and distribute the data

bases to be used in the network. It is equally important that this type of special training be made available to regional centre personnel. The training of regional staffs should be provided centrally by the individual who has been trained in the NLA.

The central and regional staffs should also be expected to provide consultation and training to potential users of the system. It may be expected that up to half of the users may ultimately perform searches without benefit of a library intermediary. User access training may be provided in short courses given to small groups within each region.

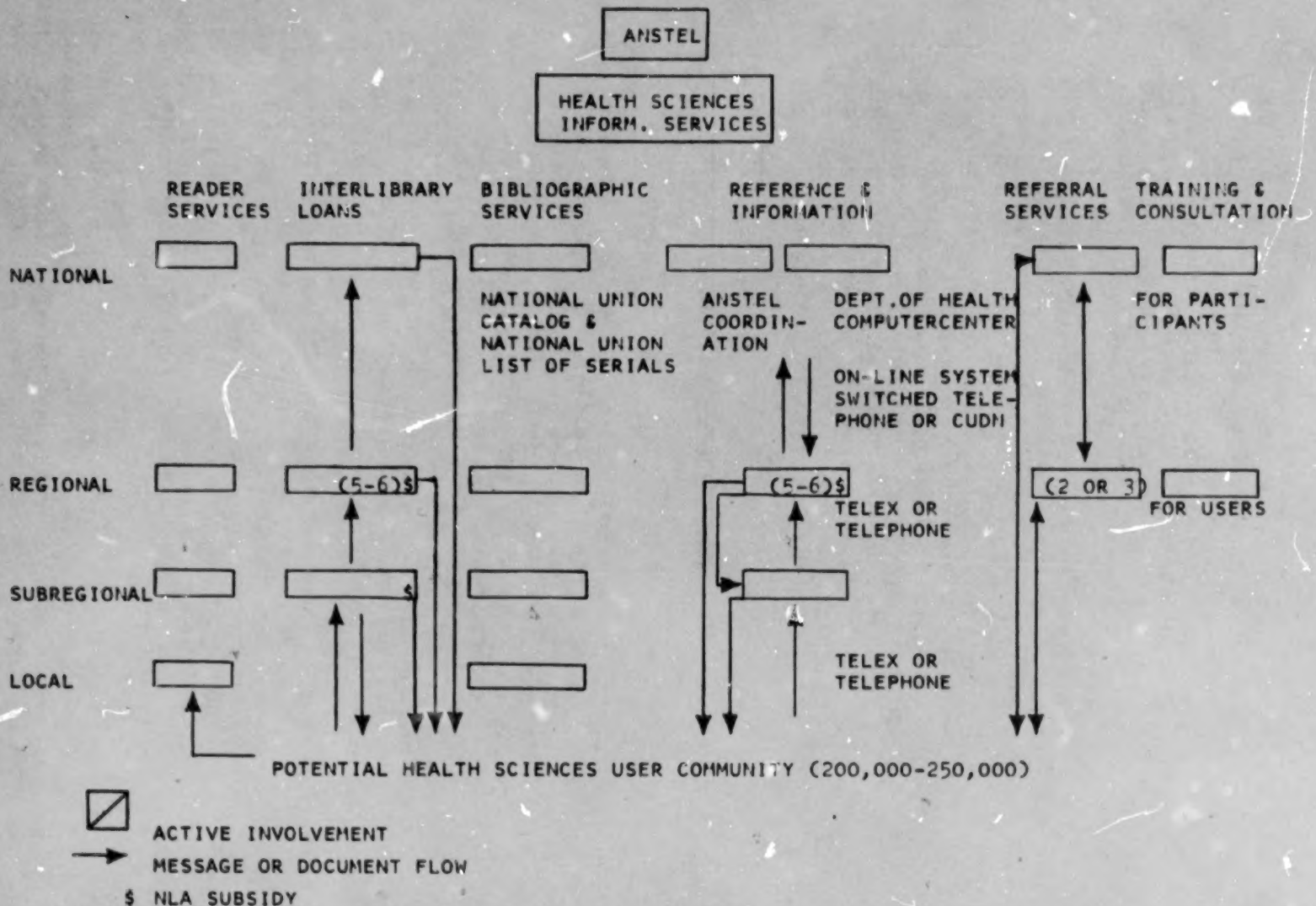
ANSTEL should also be prepared to give consultation to small institutions which request advice on collection development or an improved means of providing reader and reference services. Since there are few, if any, formally trained medical librarians in Australia, it may be necessary to provide such training to a staff member of ANSTEL. It would be desirable that such a person be assigned to the Life Sciences unit which now operates without any special competence in this field.

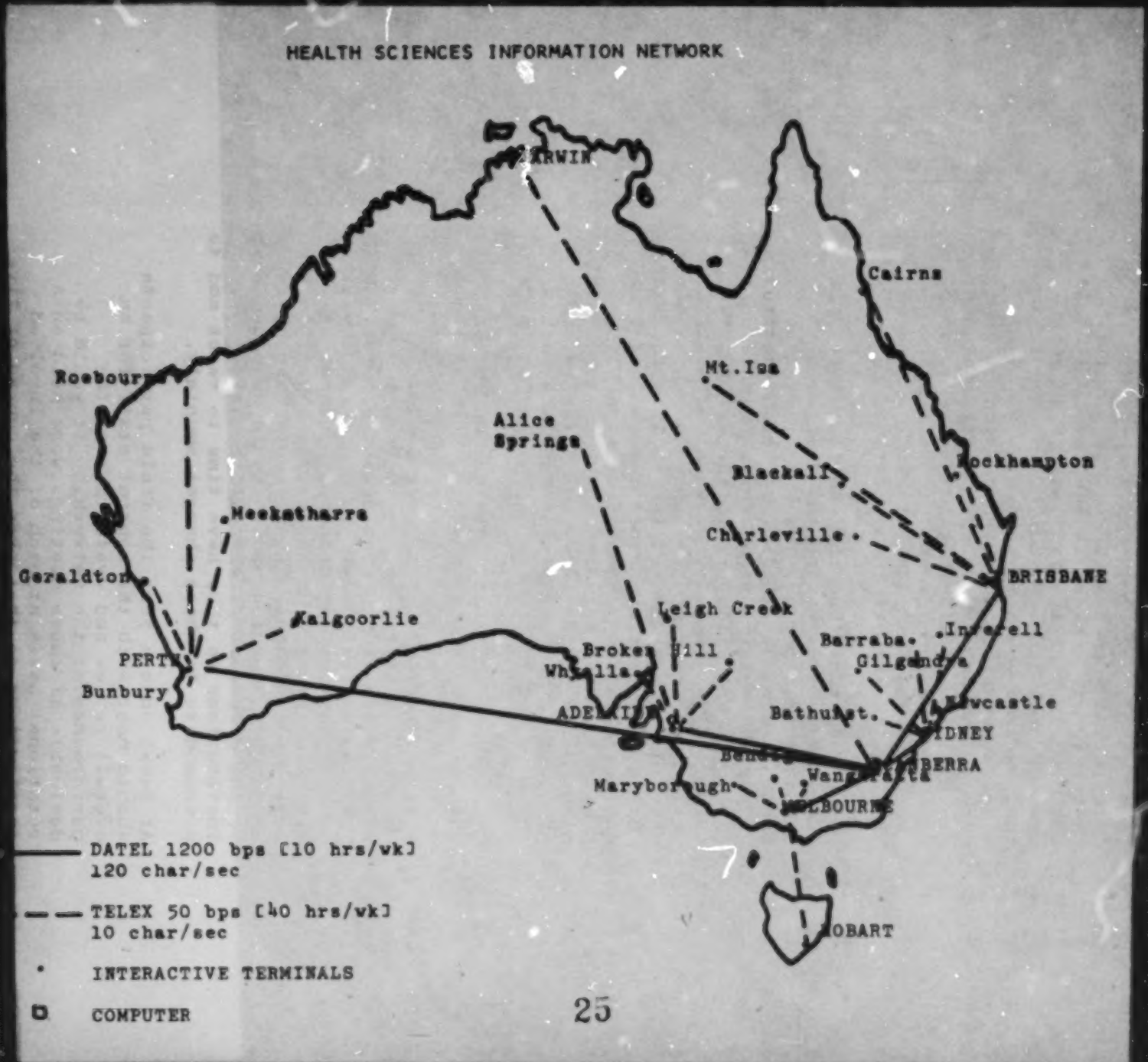
H. Functional Relationships in a Network

1. Concepts

The plan calls for integrated bibliographic, reference, referral, loan, and consultation services. Figures A and B show how the various functions previously described can be joined in a formalized systematic network. In figure A the arrows show how queries may enter the system at the local level, and how the messages or documents are provided in response. In some functional areas such as reader services there is no need to establish formal linkages. Figure B reveals how remote users may access the system and merely serves as an example of how the telecommunications to connections may function. Through this scheme the regional centres share with the NLA the major responsibility for their participation. High speed on-line reference and information services are provided through five regional centres geographically and strategically located across the country.

CONCEPTUAL FUNCTIONAL DESIGN




HEALTH SCIENCES INFORMATION NETWORK
DARWIN
Cairns
Mt. Isa
Roebourne
Alice Springs
Blackall
Rockhampton
Meekatharra
Charleville
Geraldton
BRISBANE
Leigh Creek
Kalgoorlie
Barraba
Inverell
Broken Hill
PERTH
Gilgandra
Whyalla
Bunbury
Bathurst
Newcastle
ADELAIDE
SYDNEY
Bendigo
CANBERRA
Wangaratta
Maryborough
MELBOURNE
HOBART
DATEL 1200 bps [10 hrs/wk]
120 char/sec
TELEX 50 bps [40 hrs/wk]
10 char/sec
INTERACTIVE TERMINALS
COMPUTER

2. Advisory Apparatus

A key element in the success of a multi-institutional network is the involvement of the directors of institutions in an active advisory capacity. Thus, it is crucial that such an advisory apparatus be constructed prior to the operation of the network and not subsequent to its implementation. In addition, it is desirable to have the staff members of the participating libraries who will work within the network, receive the same training provided to the staff of the central apparatus. Therefore it is important that the commitment for training be made before the test and demonstration period. The budget provides for funds to be made available to each institution to pay the salary of a science orientated librarian who will perform the key function of being the intermediary between users of the system and the computer apparatus which deals with the search and retrieval. This individual should also be responsible for the handling of the inter-library loans associated with the Health Sciences network and wherever possible might serve as the first point for referral of queries that are not appropriate within the network.

It is important that close communications be maintained both with the directors of the institutions as well as with the technical staffs involved. It is recommended that a technical bulletin be issued from the headquarters of the Life Sciences network at least every sixty days which informs the other participants of any principal changes in either programs or technical linkages. In the same way any changes which may affect policy or program issues broadly should be made known to the directors of the participating institutions so they have time to react and to accommodate to these changes smoothly.

At least once a year the field participants should meet with the central staff for an overall review and evaluation of the performance of the network. It would be desirable if these meetings were held on a rotational basis at each of the involved institutions so that over the course of five or six years every member of the network will have had an opportunity to examine the operation of the other members within the system.

2.2. TECHNICAL AND COST CONSIDERATIONS OF NETWORKING

The task of providing a conceptual design for the Health Sciences Network is made somewhat simpler because wisely, the NLA has determined to utilize existing tested data bases and related software packages rather than generate its own. This is not only the least expensive way to activate the system but it also provides the mechanism through which Australian developments become compatible with those of most advanced nations.

A. Communication Linkages

The NLA should not spend significant sums of money attempting to develop a universal software package to drive the multiple information and data bases it will require. It will be cheaper for the NLA to standardize the communications links through which the message traffic will flow rather to attempt to re-program software in an effort to standardize the data base formats to be provided. Terminals which are compatible with the centralized computer configuration may be used to search most of the data bases now available and likely to be available in the near future. At the outset users can reach the on-line terminals located in regional centres through Telex, as shown in Figure A. At a later date multiple terminals may be connected directly to the centralized computer for concurrent on-line search and retrieval.

The network can be started most expeditiously through the use of a switched telephone network (Datel) which will provide line speeds adequate for teletypewriter terminal connections to the Department of Health computer. At a later date when software programs have been written by the Department of Health, the network can use CUDN which will reduce the costs even further. The objective should be to integrate the MEDLARS inter-capital city traffic with that of the Pharmaceutical Benefits traffic which now uses CUDN. Previous experience elsewhere suggests that an average search will take 10 minutes or less. Thus, one can expect that six on-line searches can be processed for each terminal hour of connect time.

The greatest advantage for NLA development of a Health Sciences network derives from its relationship with the Department of Health which has already constructed a local terminal network which may be used for on-line MEDLINE operations in Canberra. (See Appendix 1.) This will allow the use of two terminals, (2 VDU and 2 Matrix printers) located in NLA to access the data base through input ports. In addition, the Department of Health can search the data bases through two hard-wired terminals available in the Alexander Building. The system will also allow for the operation of 5-6 remote terminals connected on-line through switched telephone connections. These may be scheduled (see Table 1) to allow various remote centres to access the data base simultaneously with the two terminals in the NLA and the two in the Department of Health. The schedules should be based on the concentration or density of potential users within each region. In the aggregate 9 terminals will be available to search data base files.

In an important report to a working seminar held at the National Library of Australia, April 16-18 1973, Mr G.E. Hams, Assistant Director-General, Postmaster-General's Department, discussed developments in telecommunications in Australia. He pointed out that since 1960 more than three million dollars had been expended to build the CUDN communications network.

The Common User Data Network (CUDN) introduced by the Post Office, may be too costly for small user groups. In theory, CUDN would seem to be the most effective arrangement for use by library-based information networks. It projects being able to provide a suitable service capable of supporting visual display units and printers throughout the nation. When connected to control computers it allows messages to be passed via terminals to various computer-based data bases which then process the requests and transmit responses to participants within the network. Although computer-based switching centres will only exist in the State capitals, interconnection with the Telex would allow small libraries at distant locations to access the system. Hams estimated that total

TABLE 1

SCHEDULES FOR REMOTE TERMINALS (12-2pm) ON SWITCHED TELEPHONE SYSTEM

Time	Port	Mon. #	Tues #	Wed. #	Thur. #	Fri. #
12-1	I	S 6	B 6	S 6	B 6	S 6
	II	M 6	B 6	M 6	B 6	M 6
1-2	I	S 6	P 6	S 6	P 6	S 6
	II	M 6	A 6	M 6	A 6	M 6
	Totals	24	24	24	24	24

no. searches
A Adelaide
B Brisbane
M Melbourne
P Perth
S Sydney

= 120 searches/week
50 weeks
6000 searches/year

DIRECT TERMINAL CONNECTIONS

12-1	Port I	C 6	C 6	C 6	C 6	C 6
	II	C 6	C 6	C 6	C 6	C 6
1-2	I	W 6	W 6	W 6	W 6	W 6
	II	W 6	W 6	W 6	W 6	W 6
	Totals	24	24	24	24	24

C Canberra - NLA
W Woden D. of H.

= 120 searches/week
50 weeks
6000 searches/year

communications costs for a library with 2000 queries per month including the rental of 2 visual displays and a printer could cost about $7,500 per year. If Hams' estimates are correct CUDN ultimately represents the most feasible mechanism for provision of computer based information services in Australia within the next five years. However, for early implementation of the network it appears that the use of switched telephone lines be the only easily available communications system until the Department of Health can provide a mechanism for the NLA to share its use of CUDN. Although dedicated lines are also available, their cost would be prohibitive during the initial phase.

For the longer run to achieve telecommunications costs that are independent of distances, the use of satellite communication may well supplant terrestrial-based systems. Since I was unable to obtain a determination of the time for development of satellite communications with Australia, it can only be assumed that this may not be available within the 5-year period considered as a reasonable requirement for the network discussed in this report.

The problem of long-distance communications is complex and costly. Although the CUDN communications network, operated by the Australian Telecommunications Division of the Postal Service, offers a reasonable means to connect with the capital cities it still remains to be determined whether CUDN can carry the load projected by the system plan. Since MEDLARS will only be a small part of total health computer traffic I believe it can be carried by CUDN. In this context I estimate that the present load of 2500 SDI's performed in batch mode monthly will double as demand increases within the first or second year of on-line operations. This estimate is based on American experiences and also on the findings by Maguire in her report upon "The information needs, usage and attitudes of medical researchers in Australia", prepared in 1975 and published by the National Library of Australia, that only half the health sciences community of Australia are familiar with the availability of the service from the NLM.

Tables 2, 3 and 4 prepared by Mr Freeman reveal the hourly telephone communications costs between Canberra and State capital cities; a suggested plan for scheduling MEDLINE access to the Department of Health computer and preliminary costs to users. I consider these estimates to be realistic and within the acceptable range of cost-effectiveness. The mean hourly costs for switched telephone lines is $18 or approximately $3 per search. Compared with the present unit costs of performing batch mode searches there will be a considerable saving measured in terms of reduced costs per search as shown in Table 4. On-line operations will be performed in the 2 hour/day window to be provided by the Department of Health. The actual size of the data base to be offered for on-line demand searches is still subject to review, the problem being the present storage capacity of the Department of Health computer. The alternatives which offer at the moment are various trade-offs between time span, i.e., one, two, three or six months of data and the inclusion of abstracts (where available) and the facility to search against words in titles and abstracts in addition to indexing terms.

Plans are in hand to upgrade the capacity of the Department of Health computer to handle a larger data base which will include text word searching, abstracts, etc. Although the size of the data base is still open it will be at least the last month MEDLARS citations (SDI/line) (approx. 18,500) and index postings file for 1-2 years data. National Library staff utilizing the new on-line facility will be able to offer regular SDI's and retrospective search facilities as they do at the present time but in addition the demand search facility will also be available. Later as the computer facilities are upgraded the system can move into the sophisticated retrospective demand search operation of larger files.

It is envisaged that in the first instance on-line demand search facilities will be offered to regional centres as mentioned above. As the system evolves, with augmentation of the health computer configuration and enlarged telecommunications capacity, subregional centres and perhaps some local institutions will be able to go on-line to the central computer. This will bring remote users closer to the information data bases providing more rapid search and response than is now contemplated with the use of Telex links to the regional centres.

TABLE 2

PRELIMINARY COSTING FOR COMMUNICATIONS BASED ON A TIME WINDOW OF 2 HOURS/DAY, 5 DAYS PER WEEK.

HOURLY RATES

LINK	SWITCHED TELEPHONE	*1200bps DEDICATED LINE	*PARTIAL DEDICATED LINE
CANBERRA-ADELAIDE	$54	40	9
BRISBANE	54	45	10
MELBOURNE	27	29	7
PERTH	54	99	23
SYDNEY	18	16	4
HEALTH - NLA (leased line)	0.4 (est).	0.4 (est).	0.4 (est).
TIME SCHEDULE			
SYDNEY 6 HRS/WEEK		ALL CENTRES 10 HRS/WK	ALL CENTRES 10 HRS/WK
MELBOURNE 6 HRS			
OTHER AUSTRALIAN CENTRES 8 HRS/WK			
NLA 20 HRS/WEEK		NLA 20 HRS/WEEK	NLA 20 HRS/WEEK
MEAN HOURLY COST	$18	$33	$8

The hourly rates for dedicated lines are based on the following present annual line costs:

Canberra-Melbourne	$14,065
Melbourne-Adelaide	20,118
Adelaide-Perth	49,625
Canberra-Sydney	7,800
Sydney-Brisbane	22,350
	$114,358

Tail loops are not included here but could add up to $1000 per centre per year.

*the use of partial or total dedicated lines depends upon an upgrading of Dept. of Health Facilities not as yet contemplated. Due to telecommunications lead times this could be 18 months away.

Table 3

Pending Costs of On-Line Services via Switched Telephone System

MEDLINE ACCESS TIME (HOURS/WEEK)	APPROX NUMBER *1 POTENTIAL SEARCHES WEEK	ANNUM	*2 TERMINAL	*3 COMMUNICATIONS	COMPUTER	TOTAL
2	8–10	400–500	$7.2–9.0	$3.60–4.50	—	$10.80–13.50
3	12–15	600–750	4.8–6.0	"	—	8.40–10.50
4	16–20	800–1000	3.6–4.5	"	—	7.20–9.00
5	20–25	1000–1250	2.8–3.6	"	—	6.40–8.10
6	24–30	1200–1500	2.4–3.0	"	—	6.00–7.50
8	32–40	1600–2000	1.8–2.2	"	—	5.40–6.70

*1 BASED UPON U.S. EARLY EXPERIENCE 4/5 SEARCHES AN HOUR. WILL BE INCREASED WHEN 6/7 SEARCHES/HR ARE ACHIEVED.

*2 BASED ON $300 MONTH RENTAL TERMINAL EQUIPMENT

*3 MEAN COMMUNICATION COST OF $18.00 AN HOUR THROUGHOUT AUSTRALIA

Table 4

Summary of figures in Australian dollars

	Retrospective Demand Searches				SDI's			
# of searches	(2700) actual	(1485) accepted	(3000) anticipated	(6050) on-line	(2500) actual	(2500) accepted	(3000) anticipated	(2500) on-line dem.
NLA								
Admin.	3.20	5.80	3.20	1.40	1.70	1.70	1.50	1.70
Analysts	7.80	16.70	12.00	5.00	2.40	3.30	3.30	1.10
Clerical	4.40	8.10	4.70	2.00	2.00	2.00	2.20	2.00
Overheads	7.70	15.30	10.00	4.20	3.10	3.50	3.50	2.40
Data base	13.60	20.80	10.40	6.80	3.40	5.20	2.60	1.70
Postage	1.00	1.00	1.00	0.50	9.00	9.00	9.00	9.00
Stationery	1.50	1.50	1.50	0.70	2.50	2.50	2.50	2.50
	$39.20	$69.20	$42.80	$20.60	$24.10	$27.20	$24.60	$20.40
HEALTH								
Programming	13.00	23.60	11.70	5.10	14.00	14.10	12.60	12.40
Clerical	3.80	3.80	3.80	1.10	2.60	2.60	2.60	2.60
Computer	19.80	19.80	19.80	10.20	30.40	30.40	30.40	19.80
Communications	-	-	-	0.20	-	-	-	-
Hardware	-	-	-	2.90	-	-	-	-
	$29.95	$39.80	$27.90	$19.50	$47.00	$47.10	$45.60	$34.80
	$75.80	$116.40	$78.10	$40.10	$71.10	$74.30	$70.20	$55.20

B. Costs of On-Line vs. Batch Mode Search Operations

The maximum number of searches now performed by the small Life Sciences staff is approximately 2,500 SDI and 2,700 retrospective searches. As shown in Table 1 it will be possible to provide more than 10,000 searches in the on-line system. In addition to the greatly improved throughput time for search and retrieval (10 minutes on-line compared to up to 4 weeks for the present batch mode operation) there will be a significant cost saving with conversion to the on-line MEDLARS system. The cost per retrospective search will be reduced from an average $75.80 (batch mode) to $40.10 (on-line) when 6,000 searches are performed. There will be a further reduction in cost of on-line searches to $32.00 when the system is fully operational at the level of 10,000 searches per year. (See Table 4)

This represents a saving of $43.00 per search. If one adds a maximum of $9.00 per search for communications costs from the Perth, Adelaide and Brisbane regional centres, the cost per search is $40.30. For regional users in Melbourne and Sydney the average communications costs will be between $2 and $3.00. The average search cost will be between $33 and $34.00 for nearby users. In addition, one should add the cost of regional search analysts which average $1.50 per search, bringing the total cost to $41.80 for Perth, Adelaide and Brisbane, and will be $34.50 - $35.50 for Melbourne and Sydney.

Using the highest communication costs ($9 for Perth) the overall NLA savings for the various levels of operation are estimated as follows:-

SDI's	2,500	searches	x $16.00	savings	= $ 40,000
Retrospective	6,000	"	x $34.00	"	= $204,000
"	10,000	"	x $35.00	"	= $350,000

This assumes that the average cost of 6,000 searches performed in batch mode is the same as the cost per search when 2,500 are processed. Even greater savings will accrue when the lesser costs for communications are calculated for Sydney and Melbourne. Maximum savings occur in the Canberra setting where communication costs are minimal.

Appendix 2 shows the breakdown in processing costs for personnel, administration and overhead. It also reveals the direct costs for the date base, stationery, postage and computer processing. It takes into account the amortization costs for computer hardware required by the on-line system (to be borne by the Australian Department of Health) as well as the communications costs for connecting NLA terminals to the Department of Health computer centre. It should be noted that there is still some question as to the actual costs of health computing and processing time. Conservative high cost estimates have been used throughout, and depending on which items are included these estimates may be reduced by as much as 50%. However, the relative costs between batch mode and on-line use will be reasonably proportional.

It should be noted also that telecommunications costs for access to the system from within ACT are nominal. Hardware connections between the NLA and Department of Health will only cost about $400 per year. Thus, the cost per search will be only a few cents as compared to $2 in Sydney, $3 in Melbourne and $9 for Perth. The more searches which can be provided in the ACT the lower the unit cost per search throughout the system. The NLA Council may wish to equalize telecommunications cost on local users to offset higher costs to be borne by distant users. One way to do this is to introduce a charge per minute of use which is the same for all users. A charge of 50¢ per minute would seem reasonable as a first approximation. The system can be organized to provide current awareness or demand searches in the on-line mode while large retrospective search requests may be entered on-line with off-line printouts returned by mail. This will reduce the telecommunications costs considerably.

The telecommunications costs may be expected to be further reduced when it is possible to use CUDN rather than Datel (switched Telephone lines) for message transmission. However, it will require a six month programming effort to develop the proper interface between ELHILL (MEDLARS software) and CUDN. Should the NLA be able to share dedicated lines with the Department of Health this communications option also may be cost effective. However, to use dedicated lines will also require hardware and software changes which will require additional funds and time.

C. Future Expansion of Services

The proposed system of computer-based reference services is readily expansible. The number of terminals in remote settings can be increased as the number of ports to the Health computer increase. Direct on-line service from distant institutions will not be required to go through the regional centres when a more adequate telecommunications network is available. As the memory and storage capacity of the Health computer are increased a larger number of data bases may be mounted and processed. In essence the growth of the system is dependent upon the computer telecommunications apparatus available.

The interlibrary lending system can be expected to increase its services as the National Library collection is strengthened. There will be the requirement for more adequate photocopying equipment when the annual number of loans increases from its present level of 500 per month to a level of 3,000 per month.

2.3. FIVE YEAR RESOURCE REQUIREMENTS

To implement the Health Services Information Network will require staffing and funding requirements for the central operations within ANSTEL as well as for the institutions selected to participate in the network. The estimates are based on a five year commitment from the Department of Health to provide computer services, and on the support for 5-6 regional libraries to be active participants in the network, effective July 1, 1976. A large reduction in the budget requirements would occur if a user-charge policy to cover the costs of telecommunications was introduced. According to Mr Richard Searle, Assistant Director General for Health, the policy of the Department is to provide NLA free telecommunications either through CUDN or dedicated leased lines in 1978. The future estimates are based on the salary scales for the 1975 Australian dollar. (See Table 5)

TABLE 5

ANSTEL

ESTIMATED RESOURCE REQUIREMENTS

	Present 1975/76	Year 1 1976/77	Year 3 1979/80	Year 5 1981/82
PERSONNEL				
Management staff	3	3	3	3
Professional staff	6	9	10	12
Clerical support	2.5	2	3	3
	11.5	14	16	18
BUDGET	$	$	$	$
Internal operations				
Staff	125,000	160,000	170,000	200,000
Data bases	55,000	60,000	80,000	90,000
Computer processing	75,000[a]	75,000[a]	b)	b)
Telecommunications	-	35,000	b)	b)
	255,000	330,000	250,000	290,000
GRANTS AND/OR CONTRACTS				
FOR LIBRARY CO-OPERATION				
Interlibrary Loan				
Operation (for service based on $2 per loan	-	90,000	135,000	135,000
Staff and support (for special information services)	-	66,000	125,000	140,000
	-	156,000	260,000	275,000
	$255,000	486,000	510,000	565,000

a) IBM Service Bureau Costs for B.A.Previews

b) Provided by Department of Health

It should be noted that only $231,000 more than the present base is required to implement the network.

2.4. IMPLEMENTATION PLAN

A. Management and Advisory Apparatus

There are several important phases of implementation which need careful definition and time scheduling. However, the first step to be taken is the establishment of a management and advisory apparatus. It is recommended that for central planning and operations the head of the Life Sciences section be designated as the single manager for the system. An advisory committee, consisting of seven to nine expert librarians, information specialists and representatives of the user community should be designated as the principal advisory committee to the system. Membership should be drawn from the Department of Health and the regional libraries. This committee should be given the opportunity to review the feasibility studies and the implementation plan in approximately March of 1976, so that they have the opportunity to learn of the funding requirements and equipment installations along with the technical plans to be implemented, (See Figure C).

Network co-ordination should be delegated to the Department of Health computer centre for technical aspects and to the NLA for queries emanating from the ultimate user.

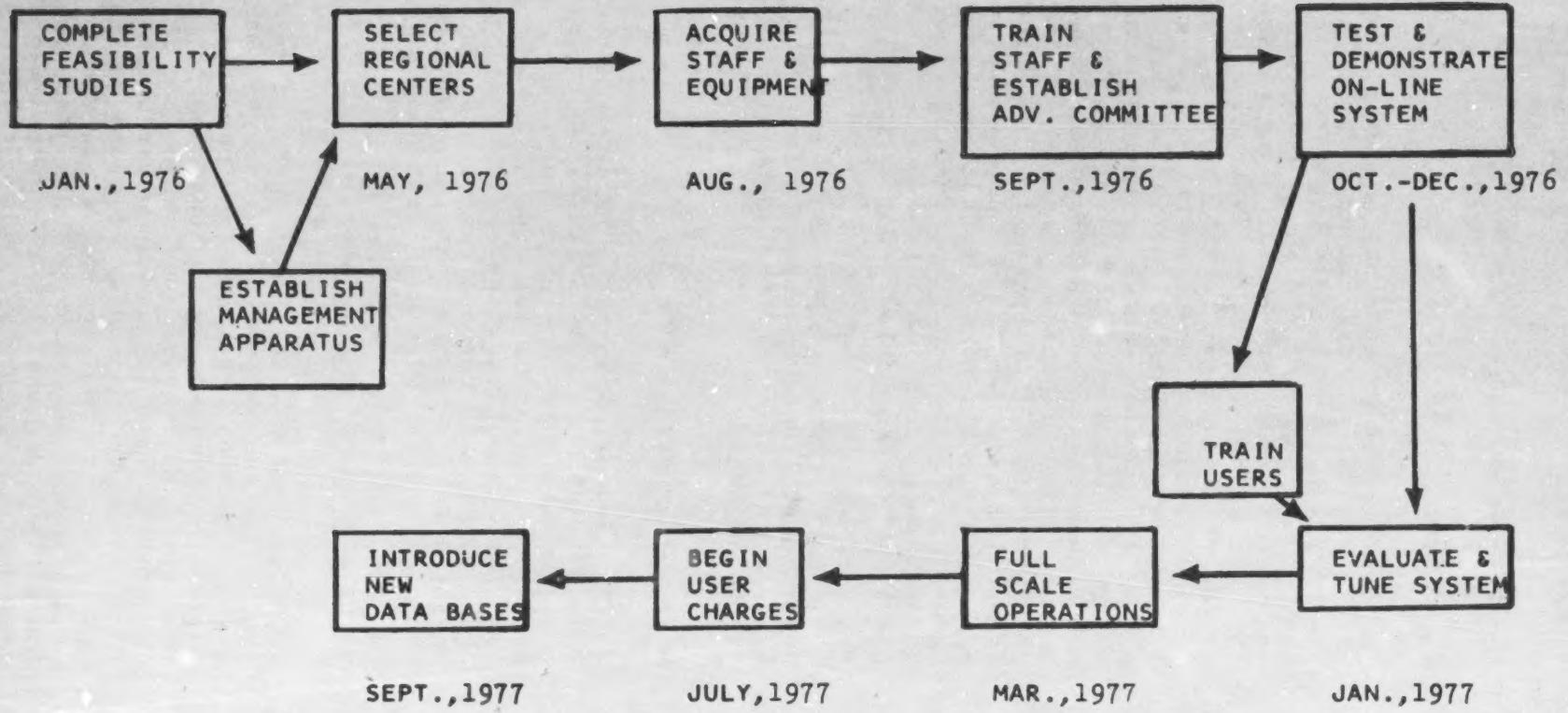
B. Regional Centres

On the assumption that the funds required will be made available in July of 1976, it is important that the regional centres to participate in the network operation be selected no later than August 1976, and immediate steps be taken to acquire and train staff both for the central operations at the National Library as well as for those individuals who will operate within the selected regional centres.

C. On-Line Computer Operations

It is estimated that intensive training for operation of the on-line systems will require a month, after which time the first tests and demonstration of on-line systems should be scheduled to begin between the period of October and December of 1976. After the on-line systems have been set up it is important that a selected community of users be trained in the best means of acquiring access to the system while at the same time learning how to technically utilize the on-line terminals to be located within the regional centres.

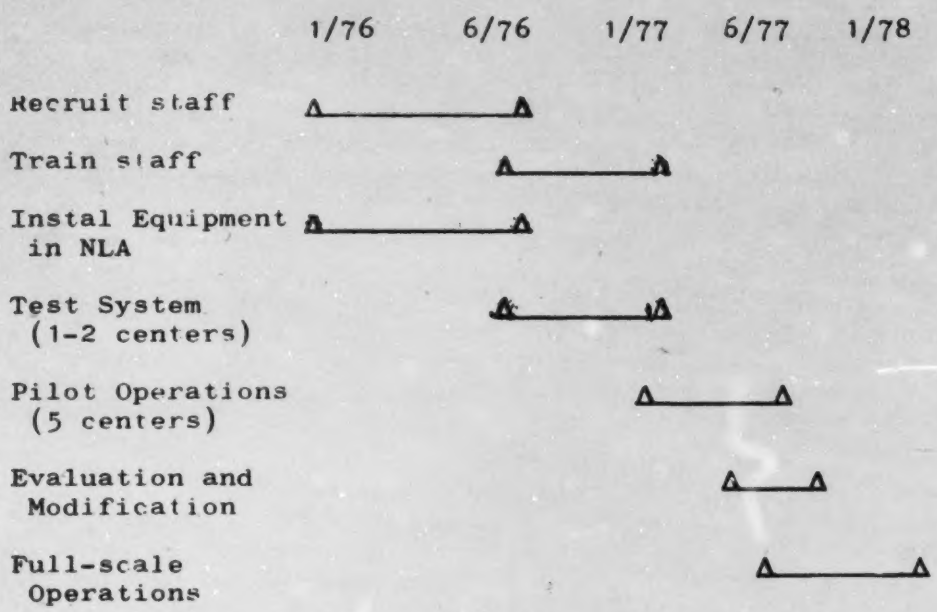
IMPLEMENTATION PLAN



On the basis of user reaction to the system, careful evaluation of user response should be made and the results of this evaluation should be used to refine and tune the system to make it more responsive to user needs.

It is recommended that a period of six months be provided for the evaluation of the performance of the system under full scale loads after which time the system should be refined and returned prior to the establishment of user charges.

ON-LINE COMPUTER BASED SERVICES IMPLEMENTATION SCHEDULE



Because of limitations of computer capacity and available ports, it is estimated that not more than 5 or 6 remote terminals may be linked to the system. These are in addition to those available at NLA and Department of Health. Remote terminals should be placed in centers of high population density. They should be operated by personnel trained in on-line search and retrieval methodology. Because telecommunications costs are comparatively high for high speed dedicated lines, it will be more practical and economical in the first instance to utilize switched telephone lines made available during the 2 hour daily period provided by the Department of Health Computer Center. Users located distant from the Regional Centers can access the system by visit, letter, telex or telephone calls to the Regional Center. At a later date the remote user can access

the system through the subregional centers. The queries can be processed on-line with the results being transmitted back to the user through telex, telephone or mail services depending on the user's needs. Two remote terminals, two terminals at NLA and one terminal within the Department of Health will be available for search and retrieval during the 2 hour access to the computer.

Estimating that 6 searches per hour can be performed, the system should be able to deliver 60 searches per day or 300 per week during the period when the five terminals are able to search the files concurrently. This will provide an annual capacity of 12,000 searches per year or 5 times more than the present batch mode operation. At an estimated maximum cost of $54.00 per hour for use of the telephone lines the telecommunications cost per search will average $9.00. This is cost effective when compared to the present batch mode operations or to the costs of human reference search operations. Across the nation the average cost will be $18.00 per hour or $3.00 per search.

Telecommunications costs should be borne by the user to avoid abuse of the system and to provide a means of controlled growth of the network. It also provides a mechanism to evaluate the utility of the service to the user.

All batch mode operations and large retrospective printouts should be carried on during hours other than those devoted to on-line usage made available by the Department of Health Computer Center. Prime on-line time usage should be limited to demand searches in which speed of retrieval is important to the user. Prime time should take into account the needs of Perth which has a 3 hour time differential during daylight saving time. Thus, it is recommended that the period of 12 noon to 2 p.m. be put aside for on-line services. This will provide equal access to all parts of the country during normal working hours.

Since institutions to be involved in the network do not have available personnel to operate the terminals, it is recommended that NLA provide a stipend for an individual to be trained to process on-line searches. The same person should also manage the ILL's performed for the systems. This person might be designated Health Services Regional Librarian, and should receive the same training as the ANSTEL staff engaged in similar operations. It would be desirable if this individual have a biomedical science background.

D. User Charges

It is recommended that user charges be implemented in July of 1977. User charges are important not only to determine whether the quality of service is worth the user's fee but also it is required as a management control mechanism to maintain a steady flow of query response activities designed to fall within the computer and communication capabilities of the system. User charges may be increased if the number of requests exceed the ability of the system to respond or may be decreased if the charges are deemed to unduly suppress use.

Under any circumstances there can be no controlled management apparatus without the implementation of some user fee. It is suggested that the user be required to pay for part or all of the communication costs involved to reach the nearest terminal as a minimum charge whereas the National Library and Department of Health should assume the costs for all of the internal operations of the system. If the computer capacity and communications linkages have been expanded successfully it is suggested that in September of 1977 consideration of the inclusion of new data bases be made and that those which are relevant to the health sciences be added to the system. Thereafter the system should be maintained at full operational levels with regular scheduled review and evaluation by the Advisory Committee or by outside groups of experts who may be needed to evaluate technical aspects of the program.

E. Staffing

The present Life Sciences staff at NLA is greatly overtaxed. Although additional staff will be required to develop and operate the on-line systems and other elements of the network even larger numbers of staff are required to satisfactorily operate the present system. Unless additional staff is provided to the Life Sciences Section the present workload should be reduced. If the latter course is taken the average cost per search in the batch mode operation will increase proportionately.

F. Funding

This implementation plan is predicated on a commitment by the government to provide the necessary additional funding for the creation of the network in FY 1976/77. Should there be a delay in the commitment the plan may still be implemented merely substituting new start dates for each of the activities identified in the implementation plan.

2.5. SUMMARY OF INTERVIEWS

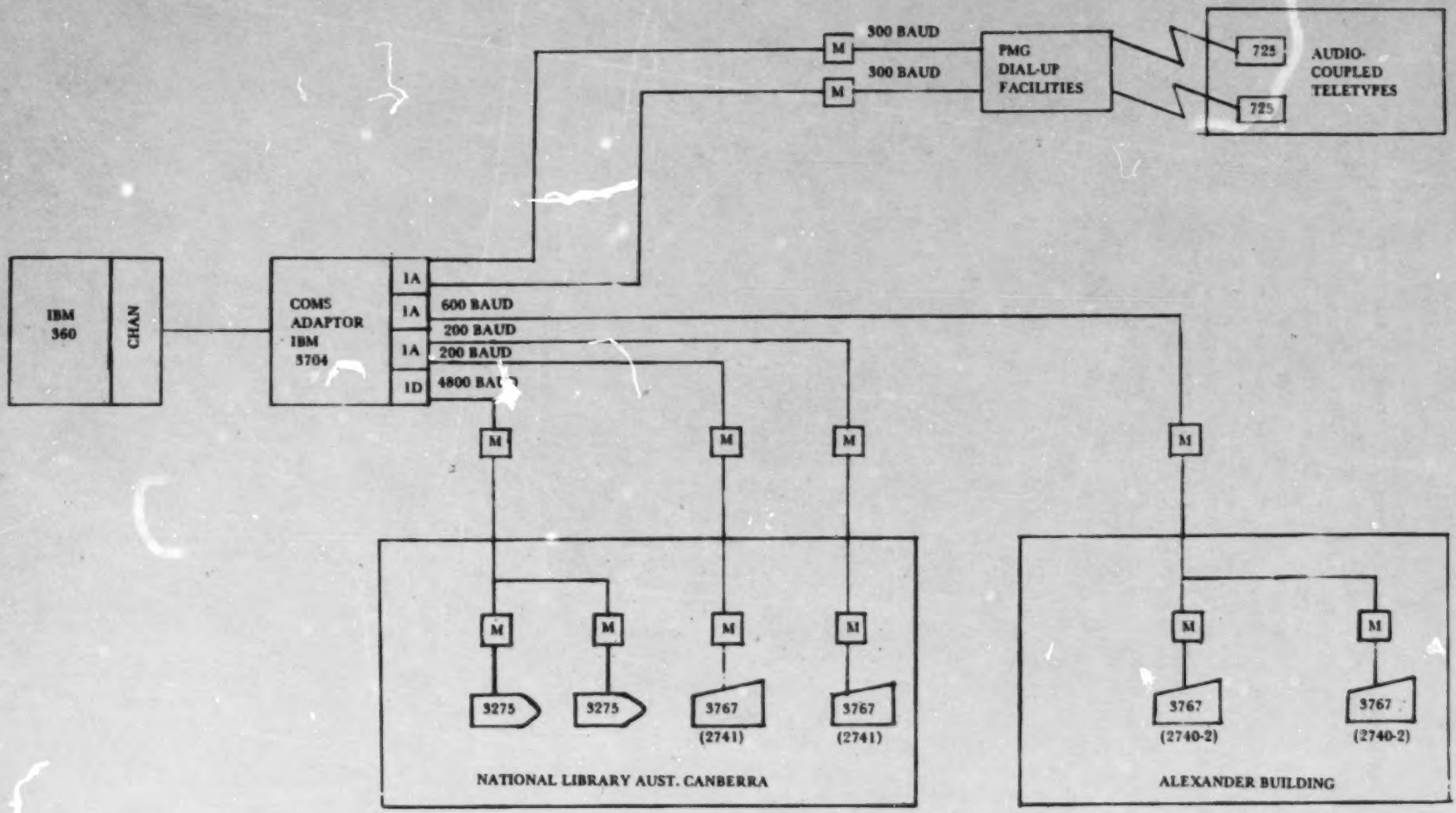
Every major university, many colleges and each medical school visited provided an excellent opportunity to meet with senior administrative officers, academic faculty members and library personnel associated with the community. In only one instance did a Vice-Chancellor express lack of interest in the plan which was presented. In all other interviews it may be stated that the concept of a health services information network was warmly received at all levels. Many constructive suggestions for modification of the proposed plan were offered and most of the suggestions were subsequently incorporated into the plan.

Several groups recommended that regional referral centers be developed in major cities with large medically orientated institutions available to give such specialized services. This suggestion was incorporated in the plan which now calls for two or three such centers to be established within the institutions selected as regional centers.

There was strong support for the concept of a library-based information network from the senior officials of the Australian Department of Health, the Chairman of the Universities Grants Commission, CSIRO Information and Library Services, and by branches of the Medical Library Association. Similar expressions of interest and support were evident when the plan was explained to several high level political figures.

Time did not permit an adequate formal survey of health practitioner interest in the plan, but a

small sample of medical practitioners with whom I met informally suggested that they would be interested in trying the services offered, even on a fee for service basis. The only students surveyed were those who are working for post-graduate degrees in the life sciences (principally at A.N.U.) and they were uniformly enthusiastic in support of the concept. I consider my inability to sample reactions from dentists, nurses and other allied health professionals as a deficiency in my effort.



DEPARTMENT OF HEALTH

49

Local Terminal Network

50

APPENDIX 1

Control Units	I.B.M. 3270	(1)
	I.B.M. 3704	*(1)
VDUs	I.B.M. 3277	(13)
	I.B.M. 3275	*(2)
Hardcopy terminals	I.B.M. 3767	*(4)
Off-line printer	I.B.M. 3284	(1)
Dial-up terminals	T.I. 725	(2)

* Used by MEDLARS II

Terminals located at the National Library

	I.B.M. 3275	(2)
	I.B.M. 3767	(2)

APPENDIX 2.

Estimated MEDLARS Processing Costs

1 These data have been provided by Mr Mike Middleton (N.L.A.) to supplement those which he made available in October, 1975. They represent 'anticipated' costs for mid 1976 as well as actual and estimated accepted costs.

2 Three sets of cost figures are tabulated following the calculations, together with the 'anticipated' costs.

3 The three sets additional to anticipated costs are as follows:

actual costs - based on present actual workload, throughput and analyst salaries.

accepted costs - based on the acceptable number of searches for the number of analysts employed, assuming that the analysts are appropriately graded.

on-line costs - based on acceptable on-line performance for 3 analysts each using a terminal 2 hours per day.

4 Assuming that an additional trained analyst is required, the anticipated figures for batch processing are realistic. They enable incorporation of an expected growth rate in the amortization of the data base cost.

5 Estimates of processing components - NLA - Life Sciences

a) Analysts:

of analysts per day

Time Division	demand searches	SDI
actual	2 1/4	3/4
accepted	2 1/4	3/4
on-line	2 3/4	1/4

Workload

	demand	SDI	
actual	2700	2500	(per year per 3 analysts)
accepted	1485	2475	(per year per 3 analysts (220 days/yr))
on-line	6050	2475	(2 hr window on ELHILL) (daily for each analyst)

Salaries

	demand	SDI
actual $27,000/yr	$21,000	$6,000
accepted $33,000/yr	$24,750	$8,250
on-line $33,000/yr	$30,250	$2,750

Analyst cost per search (to nearest $0.1)

	demand	SDI
actual	21000/2700 approx. $7.80	6000/2500 approx. $2.40
accepted	24750/1485 approx. $16.70	8250/2475 approx. $3.30
on-line	30250/6050 approx. $5.00	2750/2475 approx. $1.10

b) Administration

Salary

$13,000/yr

Time division

2 demand/1 SDI ($8,670/4,330)

Admin. cost per search (to nearest $0.1)

	demand	SDI
actual	8670/2700 approx. $3.20	4330/2500 approx. $1.70
accepted	8670/1485 approx. $5.80	4330/2475 approx. $1.70
on-line	8670/6050 approx. $1.40	4330/2475 approx. $1.70

c) Clerical

Salaries

$12,000 demand/yr
$ 5,000 demand/yr

Clerical cost per search (to nearest $0.1)

	demand	SDI
actual	12000/2700 = $4.40	5000/2500 = $2.00
accepted	12000/1485 = $8.10	5000/2475 = $2.00
on-line	12000/6050 = $2.00	5000/2475 = $2.00

d) Overheads

Overhead cost per search (to nearest $0.1)

Taken as 50% of combined salaries for administrative, analysts, clerical.

	demand	SDI
actual	(7.80+3.20+4.40)/2 = $7.70	(2.40+1.70+2.00)/2 = $3.10
accepted	(16.70+5.80+8.10)/2 = $15.30	(3.30+1.70+2.00)/2 = $3.50
on-line	(5.00+1.40+2.00)/2 = $4.20	(1.10+1.70+2.00)/2 = $2.40

e) Data base

Annual cost $47,500
Assumptions 1 - no increase in demand

2 - each year's tape to be used as current file for 4 years, and as backfile for 4 years.

actual usage	1 x 2500 SDI/year	2500	
	4 x 2700 demand year	10800	
	4 x 200 backfiles	800	
cost for 1 year's search is 47500 ÷		14000	= $3.40
accepted	1 x 2475 SDI/year	2475	
	4 x 1485 demand/year	5940	
	4 x 200 backfiles	800	
cost for 1 year's search is 47500 ÷		9215	= $5.20
on-line	1 x 2475 SDI/year	2475	
	4 x 6050 demand/year	24200	
Assuming MEDLARS I backfiles			
	4 x 200 backfiles	800	
cost for 1 year's search is 47500 ÷		27475	= $1.70

Hence data base cost per search (to nearest $0.1)

		demand	SDI
actual	(4 x $3.40)	$15.60	$3.40
		4 yr search	1 year
accepted	(4 x $5.20)	$20.80	$5.20
		4 yr search	
on-line	(4 x $1.70)	$6.80	$1.80
		4 yr search	

f) Postage

According to registry, postage varies from $0.40 to $20.00 per item depending on destination, weight and method of delivery.

On their advice:

Average cost for demand search = $1.00
Average cost for monthly SDI = $0.75 = $9.00/year

This can be applied to each set of costs, except on-line demand, where proportion of paper printout may halve costs - say $0.50.

g) Stationery

	demand	SDI
actual	150 units/yr @ $17.75 = $2,650	350 units/yr @ $17.75 = $6,200

Therefore stationery cost per search (to nearest $0.1)

$2650/2700 = $1.00 search + $0.50 overheads for other printed material.	$6200/2500 = $2.50 search

These figures of $1.50 and $2.50 may also be applied to the accepted and the anticipated cost estimates.

For on-line demand searches, the cost for stationery will probably be reduced to about $0.70/search.

Estimates of processing components - Department of Health

a) Programming support

Salaries - $70,000/yr
For on-line - $61,500

Assuming an equal time division between demand searches and SDI's ($35,000 each) or $30,750 each for on-line operation of demand searches.

Programming cost per search (to nearest $0.1)

	demand	SDI
actual	$35,000/2700 = $13.00	$35,000/2500 = $14.00
accepted	$35,000/1485 = $23.60	$35,000/2475 = $14.10
on-line	$30,750/6050 = $5.10	$30,750/2475 = $12.40

b) Clerical support

For batch demand search $198/week
For on-line demand or any SDI search $126/week (no data processing officer time required).

Clerical cost per search (to nearest $0.1)

	demand	SDI
actual	$10,300/2700 = $3.80	$6550/2500 = $2.60
accepted (assume the same figures as above).		
on-line	$6550/6050 = $1.10	$6550/2475 = $2.60

c) Computer processing (based on commercial rates)

		demand	SDI
actual	processing	$43,000 yr	$65,000 yr
	maintenance	$10,500 yr	$10,500 yr
		$53,500	$76,000
accepted (assume same as for actual on pro rata processing).			

on line processing 2 hr/day
of which SDI would be running concurrently
30 hr/month - approx. 75% of time.

Computer time division demand/SDI = 2;1 1/2 hours/day.

	demand	SDI
on-line	$\frac{4}{7}$ x \$90000	$\frac{3}{7}$ x \$90000
	= \$51400	= \$38600
	+ \$10500	+ \$10500

The reduction in SDI processing costs is based on the assumption that SDI (performed in batch mode) will be performed concurrently with the on-line Medlars searches (MEDLINE).

Computer processing costs per search (to nearest \$0.1)

	demand	SDI
actual	\$53500/2700 = \$19.80	\$76000/2500 = \$30.40/yr
accepted (assume same as actual)		
on-line	\$61900/6050 = \$10.20	\$49100/2475 = \$19.80

d) Computer hardware

Hardware amortization for batch processing is encompassed by the processing costs previously calculated.

For on-line processing, the requirement is 10 double density disks with requisite software conversion \$210,000 amortized over 10 years, and 5 terminals (2 VDU's at \$13,500 each and 2 teletypes at \$24,000 each) at \$75,000 amortized over 5 years. Since MEDLARS represents only 1/8 of the total utilization therefore the hardware cost per search (to nearest \$0.1) is

\$(210,000/80+75000/5)/6050 = approx. \$2.90 search for on-line demand searches.

e) Communications costs within Canberra

Line costs	\$316.00 per/yr
Modem costs	\$1220.00 per/yr
Total	\$1536.00 per/yr

Therefore cost per search is \$1536/6050 = \$0.20.

Footnote

a) All costs are derived solely for the NLA operation and are based on the assumption of economies of scale. The ELHILL software can accommodate far more searches than the number projected.

b) Mr Freeman has made a tabulation of estimated communication costs/search for interstate users with their own terminals.

Assuming the availability of 10 hours/week on each dial-in port at the Department of Health, and that there is one terminal in each of 5 States, then each user would have 4 hours access per week.

From Mr Freeman's tabulated figures, this would enable each institution to process 800-1000 searches/year at a communications cost to it $8.60 - $9.50/search.

This system will allow an additional 4000-5000 on-line searches to be processed each year. If an additional 4000 searches are made, then the data base, programming and computer cost components of each search would be reduced by approximately 40%. (The on-line estimates presented in previous calculations would change from 6000 to 10,000 searches per year). All other components would remain approximately the same on a pro-rata basis.

The data base, programming and computer components amount to $22.20 (54%) of the $41.00 of the on-line cost/search for 6,000 searches, so an overall reduction in cost/search of approximately 22% (40% of 54%) could be expected for 10,000 searches.

For 10,000 searches/year, cost of 1 search at the National Library is therefore 78% of $40.10 = $31.30.

For 10,000 searches/year, cost of 1 search at remote location is $31.30 + $9.00 communications = $40.30 for the most distant regional users.

Costs/search would be further reduced by about 5% if one of the terminals at the Department of Health were to be fully utilized for searching.

3. IMPLEMENTATION OF A LIFE SCIENCES INFORMATION NETWORK

By Colin Freeman, Principal Librarian, Life Sciences

3.1. IMMEDIATE DEVELOPMENTS

The Council of the National Library have accepted the broad principles for network development in the Life Sciences as set out by Dr Cummings and will implement these as resources become available.

Although it will not be possible to implement all recommendations fully in the first instance, it is considered that it will be possible to proceed in a limited fashion, based upon plans laid down in the NLA during the time of the STISEC report, and expand the network at a later date in a natural progression.

3.1.1. As a first step in development, the National Library will offer on-line MEDLINE services to selected institutions in centres where there is heavy use of biomedical information services. If finances are available, the BA PREVIEWS service will be expanded, and training seminars for librarians throughout Australia will be resumed. The information contained in these two major data bases has extreme relevance to workers in a wide range of professions, occupations, and to many industries, e.g., Nursing, Dentistry, Veterinary Science, General Practice, Opticians, Pharmaceutical Industry, Forestry, Agriculture, Occupational Health, Community Health Services.

3.1.2. The funding mechanisms suggested by Dr Cummings will not be possible in the immediate future and consequently participating institutions will be required to finance their own on-line operations. However, it is hoped that such institutions will continue to adhere to the broad principles of resource sharing as they have done in the past, and will offer initially limited services in their regions to individuals and institutions in addition to members of their own institution.

3.1.3. Meanwhile the National Library, within the constraints of its limited budget, will continue with the development of services from the various computer based systems, with a view to expanding services on a nation-wide basis. Priority is being given to the training of the specialist staff in the National Library, required to train in turn the staff of co-operating institutions.

3.1.4. It is anticipated that some rationalization of Life Sciences collections within the National Library, and in the various participating institutions, will be accomplished in discussions with participating libraries. This action is intended as the preliminary step toward implementation of the first broad principle set out for ALBIS; the development of a comprehensive collection of library materials. Discussions on this and other issues related to on-line services should help to forge a community of interest amongst the group.

3.1.5. The basic rules for MEDLINE services will be established at these meetings. The question of charges and regional responsibilities will be covered as a matter of course.

3.2. PROGRESSIVE DEVELOPMENTS

3.2.1. Life Science Data Bases

Within the MEDLARS system plans are in hand to eventually offer a three to four year MEDLINE file, and to provide alternative data bases, in particular TOXLINE, CHEMLINE, CANCERLINE. In the first instance however, we shall offer:-

(a) A monthly MEDLINE, a file containing approximately 18,000 references to the latest biomedical literature, a large proportion of which will contain abstracts. This will be updated each month, and will provide all facilities currently available from the MEDLARS system e.g., the ability to search for words in titles and abstracts, in addition to the index terms allocated from the MESH vocabulary.

(b) As an additional service, the largest possible segment of the planned three to four year file we can mount within the constraints of available computer space. This will probably contain 80-100,000 references without abstracts, and most probably references to English language materials. This will be updated from time to time as required.

(c) Although the average on-line search will be limited to a maximum retrieval of 25 references the facility is available for a prepared search to be matched against retrospective files in an off-line batch mode directly through the telecommunications link. Subsequent printout will be sent from the National Library several days later.

3.2.2. The Library has successfully operated the BA PREVIEWS service for two years. Skills have been developed using the data base, and it is our intent to pass these skills on to the library Life Sciences community in Australia. This will be in the form of a series of working seminars involving librarians and ultimately, users with interests in the data base. The National Library will provide computing and an editing process for all profiles entered into the system.

3.2.3. Since the Library possesses the systems software to enable it to process several other data bases of concern in the Life Sciences field, consideration is being given to the inclusion of Psychological Abstracts as a service, and to an expansion of services from the Science Citation Index in particular, within the Life Sciences area. The ultimate aim with these services will be to pass on profiling skills to the end users in libraries outside Canberra.

3.2.4. A number of automated information services are now offered on-line by various organizations in the United States. Many of these have extreme relevance to the Life Sciences field, e.g. the Lockheed Dialog System, State University of New York (SUNY) services. Plans are in hand to establish a direct link with these services via the international communications network. The technical findings of this operation will be passed on to other institutions wishing to establish their own contacts with the United States.

3.2.5. Back-up documentation

Within the terms of the National Library Act, the Library has a responsibility to offer services to the Australian community as a whole. Consequently, it is intended to expand the collections and services currently available from ANSTEL. The Life Sciences field is only one component of the general area of Science and Technology of course, but priority is being given to the acquisition of materials to provide total support for our automated information services. It is anticipated that libraries involved in the network will provide a degree of service from their own collections to users within their regional area, and refer requests for locally unavailable materials to ANSTEL.

3.3 ESTIMATED RESOURCE REQUIREMENTS FOR A LIFE SCIENCE INFORMATION NETWORK

(HEALTH SCIENCE FIGURES IN PARENTHESIS)

PERSONNEL	1975/76	1976/77	1977/78	1978/79
Management	3	4 (3)	4 (3)	4 (3)
Professional	6	12 (9)	12 (9)	13(10)
Clerical Support	3	3 (2)	4 (2)	5 (3)
	12			
BUDGET	$	$	$	$
Staff	125,000	205,000(160,000)	210,000	225,000
Data bases	55,000	46,000 (60,000)	74,000	66,000
Computer Processing	75,000	260,000 (75,000)	310,000	350,000
Telecommunications	-	- (35,000)	-	-
	255,000	511,000(330,000)	594,000	641,000
GRANTS OR CONTRACTS FOR LIBRARY CO-OPERATION				
Inter-Library Loans (based on $2 per loan)	-	90,000 (90,000)	110,000	130,000
Staff and Support	-	66,000 (66,000)	75,000	125,000
		156,000(156,000)	185,000	255,000
NLA Expenditure on Collection Building and ANSTEL Support Services	-	250,000	250,000	250,000
TOTAL NLA expenditure	255,000	919,800(486,000)	1,029,000	1,146,000

3.4. IMPLEMENTATION PLANS

Commencement date	Action by NLA	Action by Aust. Govt. Bodies	Action by External Organizations	Joint Action
1976	*Further development of ANSTEL collection and associated services. (a) Materials (b) Data bases *Allocation of terminal locations in regional libraries. *Arrange initial meetings of participating libraries. *Provide training for staff of participating institutions.	*Department of Health to consolidate computer back-up services along lines already laid down.	*Preliminary rationalization of collections to support automated Information Services. *Provision of terminals. *Provide staff to operate Automated Information Services.	*Rationalized spheres of responsibility and ILL operations Modus operandi of joint Advisory Committee.
1977	*Further development of ANSTEL collection and associated services. (a) Materials (b) Data bases *Expansion of terminal locations to additional organizations.	*Department of Health to further develop computer back-up services.	*Trained staff to train users in information services. *Further rationalization of support collections and services. *Provision of higher line speed terminal devices.	*Further rationalization of spheres of responsibility and ILL operations based on 1 year of operating experience. *Preparation of a directory of co-operating institutions.

Commencement dat	Action by NLA	Action by Aust. Govt. Bodies	Action by External Organizations	Joint Action
1977	*Implementation of higher line speed services. *Training for staff of participating institutions.			*Examination of component four in ALBIS plans.
1978	*Further development of ANSTEL collections and associated services. (a) Materials (b) Data bases *Consolidate network operations in co-operation with user group. *Maintain training functions as required.	*Department of Health consolidate computer back-up services.	*Consolidate support collections and services. *Continuing user training function.	*Blend Life Sciences operations with other developing networks. Continue planning for component 4 in ALBIS plans and on suggestions of NLA consultant.